Review and Report of cleaner coal technology organisations in India

Future Energy Solutions (FES) of AEA Technology Plc.

Contract C/07/00309/00/00

by

Tata Energy Research Institute
New Delhi, India

November 2002

ta Energy Research Institute 2002

gested format for citing this report is as follows.
ERI. 2002
eview and Report of Cleaner Coal technology organisations in India
ew Delhi: Tata Energy Research Institute.
ERI Project Report No. 2000/ID/41]

ore information about this report, please contact
mation Dissemination Service
I **Telephone** +91 11 2468 2100 or 2468 2111
ri Seth Block **E-mail** mailbox@teri.res.in
at Place, Lodhi Road **Fax** +91 11 2468 2144 or
2145
Delhi – 110 003 / India **Web** www.teriin.org

Project Team

Beena Menon	Manager, Information Dissemination Services
Saif Alauddin	Information Analyst, Information Dissemination Services
Triveni Chauhan	Project Manager, UK Cleaner Coal Technology Transfer Programme
T Radhakrishnan	Computer Analyst, Publication Unit
P Sabari Nath	Secretarial Assistant, Information Dissemination Services

Reviewed by

Mr P V Sridharan	Senior Fellow, TERI

Contents

---

1. Introduction

2. Overview of Coal in India

- *Coal mining in India: the past*
- *Nationalisation of coal mines*
- *Coal: choice for Indian Energy*
- *Coal beneficiation*
- *Opportunities*
- *New agenda*
- *Foreign collaboration*
- *Scope of foreign investment in the coal sector*
- *Opportunities open to the foreign investors*
- *India's clean coal technology progress*

3. Government Organisations

- Ministry of Coal & Mines
  - *Functions and responsibilities*
  - *Organisational structure- Ministry of Coal*
  - *Foreign collaboration*
- Coal India
  - *Functions*
  - *North Eastern Coalfields*
- Subsidiaries
  - *Northern Coalfields Ltd*
  - *Central Mine Planning & Design Institute Ltd*
  - *Bharat Coking Coal Ltd*
  - *South Eastern Coalfields Ltd*
  - *Western Coalfields Ltd*
  - *Eastern Coalfields Ltd*
  - *Central Coalfields Ltd*
  - *Mahanadi Coalfields Ltd*

- Singareni Collieries Company Ltd (SCCL)

Ministry of Power
- *Bureau of Energy Efficiency*
- *National Thermal Power Corporation*
- *Central Power Research Institute*
- *Power Finance Corporation Ltd*

Ministry of Heavy Industry and Public Enterprises
- *Bharat Heavy Electricals Ltd*
    - Research & development at BHEL
    - Coal Research facilities at BHEL
- *Heavy Engineering Corporation Ltd*

Ministry of Science and Technology
- *Council of Scientific and Industrial Research*
- *Central Fuel Research Institute*
- *Central Mining Research Institute*
- *Indian Institute of Chemical Technology*
    - Coal and Gas based technologies

4. Industry
- Tata Robins Fraser Ltd
- Industrial Equipment manufacturing Company Private Ltd
- Alstom India

5. Trade Associations/ Organisations
- Confederation on Indian Industries (CII)
- Federation of Indian Chambers of Commerce & Industry (FICCI)
- PHD Chambers of Commerce & Industry (PHDCCI)

6. Others
- Infrastructure Development Finance Company Ltd. (IDFC)
- State Bank of India Capital Markets Ltd
- Industrial Credit Investment Corporation Ltd
- Industrial Finance Corporation of India

Bibliography

Indian clean coal technology organisations

Introduction

Future Energy Solutions (FES) of AEA Technology Plc manages the UK Cleaner Coal Technology Programme on behalf of the Department of Trade and Industry (DTI) UK. Technology transfer is an important part of the programme and a comprehensive publication and information dissemination network has been in existence for a number of years. With an increasing emphasis being placed on international collaboration in the development of cleaner coal technologies, FES of AEA Technology Plc aim is to establish a CCT information dissemination network in India.

This report presents the current scenario in the coal and related industries which have their interest in coal mining, coal preparation and domestic, commercial and industrial use of coal, power generation and trade associations working with the industry.

Overview of coal in India

India is the fourth largest producer of coal in the world, with total coal reserves of 213 905MT (million tonnes)(as on 1st January 2001) of which proven reserves are around 84 414MT. Lignite reserves in the country are estimated at 34 168MT. Coal is one of the primary sources of energy, accounting for about 67% of the total energy consumption in the country.

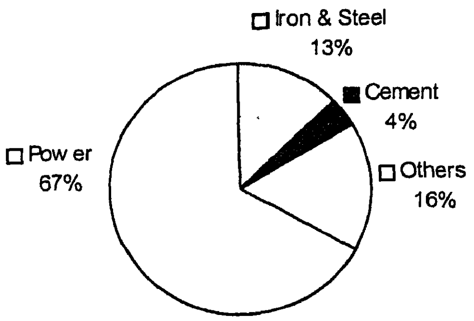
About 97% of the country's total coal production is attributed to national coal companies, of which Coal India Ltd accounts for 87% and the Singareni Collieries Company Ltd for 10%. [1]

With limited reserves of petroleum and natural gas, and the negative perception of nuclear power in the country, coal is expected to continue to play an important role in Indian energy generation.

Indian coal suffers from high ash content and low heating value. The quest for efficient and economic combustion of low quality coal has led to the development of innovative combustion technologies, which enhances combustion efficiency on the one hand, and reduce harmful emissions on the other.

Figure 1 shows the current coal consumption pattern in India [Coal in the Energy Supply of India, Coal Industry Advisory Board, International Energy Agency,2002][2]. Power generation is, by far, the most dominant market sector, consuming over two thirds of total production. Steel is the second largest market for coal followed by cement manufacture, another significant market. Other uses of coal include fertilisers, chemicals production, papermaking, sugar, etc.

Figure 1 Consumption pattern of coal in India (in billion tonnes)



Source. International Energy Agency / Organisation for Economic Co-operation and Development.

Coal mining in India: the past[3]

India has a long history of commercial coal mining covering nearly 220 years starting from 1774 by M/s Sumner and Heatly of East India company in the Raniganj Coalfield along the western bank of river Damodar. However, for about a century the growth of Indian coal mining remained sluggish for want of demand but the introduction of steam locomotives in 1853 gave a fillip to it. Within a short span, production rose to an annual average of 1 million tonne (mt) and India could produce 6.12MTs per year by 1990, and 18MTs per year by 1920. The production got a sudden boost from the First World War but went through a slump in the early thirties. The production reached a level of 29MTs, by 1942, and 30MTs by 1946.

---

[1] TEDDY 2001/2002, TERI

[2] Coal in the Energy Supply of India, Coal Industry Advisory Board, International Energy Agency, 2002.

[3] Ministry of Coal & Mines, Website: www.coal.nic.in

With the advent of Independence, the country embarked upon the 5-year development plans. At the beginning of the 1st Plan, annual production went up to 33MTs. During the 1st plan period itself, the need for increasing coal production efficiently by systematic and scientific development of the coal industry was being felt.

The first major step towards planned development of Indian Coal industry included the setting up of the National Coal Development Corporation (NCDC), in 1956. This was a Government of India Undertaking and its collieries were owned by the Railways, as its nucleus. Along with the Singareni Collieries Company Ltd. (SCCL) which was already in operation since 1945 and which became a Government company under the control of Government of Andhra Pradesh in 1956, India thus had two government coal companies in the fifties. SCCL is now a joint undertaking of government of Andhra Pradesh and Government of India sharing its equity in 51:49 ratio.

Nationalisation of coal mines[4]

Right from its genesis, the commercial coal mining in modern times in India has been dictated by the needs of the domestic consumption. On account of the growing needs of the steel industry, a thrust had to be given on systematic exploitation of coking coal reserves in Jharia Coalfield. Adequate capital investment to meet the burgeoning energy needs of the country was not forthcoming from the private coal mine owners. Unscientific mining practices adopted by some of them and poor working conditions of labour in some of the private coal mines became matters of concern for the Government On account of these reasons, the Central Government took a decision to nationalise the private coal mines.

The nationalisation was done in two phases, the first with the coking coal mines in 1971-72 and then with all other coal mines in 1973. In October, 1971, the Coking Coal Mines (Emergency Provisions) Act, 1971 provided for taking over in public interest of the management of coking coal mines and coke oven plants pending nationalisation. This was followed by the Coking Coal Mines (Nationalisation) Act, 1972 under which the coking coal mines and the coke oven plants other than those with the Tata Iron & Steel Company Ltd and Indian Iron & Steel Company Ltd, were nationalised on 1st May 1972 and was brought under the Bharat Coking Coal Ltd (BCCL), a new central Government Undertaking. Another Enactment, namely the Coal Mines (taking Over of Management) Act, 1973, extended the right of the Government of India to take over the management of the coking and non-coking coal mines in seven states including the coking coal mines taken over in 1971. This was followed by the nationalisation of all these mines on 1st May 1973 with enactment of the Coal Mines (Nationalisation) Act, 1973 which now is the piece of central legislation determining the eligibility of coal mining in India.

---

[4] Ministry of Coal & Mines, Website: www.coal.nic.in

Coal: choice for Indian energy[5]

Coal is the most important and abundant fossil fuel in India. It accounts for 63% of the country's energy need. The country's industrial heritage was built upon indigenous coal.

Commercial energy consumption in India has grown from a level of about 26% to 68% in the last four and half decades. India accounted for 12.5% of total primary energy consumption in the Asia-Pacific region and 3% of world primary energy consumption in 2000/01 (British Petroleum 2001). Per capita energy consumption remains low at 486 kgoe/year (Kilogram of oil equivalent) compared with a world average of 1659 Kgoe/year in 1998 (World Bank 2001).[6]

Considering the limited reserve potentiality of petroleum and natural gas, eco-conservation restriction on hydel project and geo-political perception of nuclear power, coal will continue to occupy centre-stage of India's energy scenario.

With hard coal reserves around 213 billion tonnes, of which 84 billion tonnes are proven, Indian coal offers a unique eco-friendly fuel source to domestic energy market for the next century and beyond. Hard coal deposit spread over 27 major coalfields, are mainly confined to eastern and south central parts of the country. The lignite reserves stand at a level around 26 billion tonnes, of which 90% occur in the southern state of Tamil Nadu.

Coal beneficiation[7]

The use of beneficiated coal has gained acceptance in steel plants and power plants located at a distance from the pit-head. Currently, India has 21 large coal washeries. There is considerable scope for private investment in this area, with the government now permitting build-own-operate (BOO) washery projects by coal companies and as agents of coal consumers.

The opportunities[8]

India's coal demand is projected to increase significantly in the next 5 years due to the completion of on-going coal based power projects, and demand from metallurgical and other industries.

The coal demand in the terminal year 2006-07 of the Tenth Plan is estimated at 448 MT. This implies an annual compounded growth rate of almost 5.2% in the 10th Plan as against as anticipated growth of 3.3% during the ninth plan (1996/9 to 2001/2002). The coal production target in 2006/07 is set at 405 MT leaving a deficit of 43MT, which would be met through imports. The domestic production has to increase from about 325 MT in 2001-2002 to 405 MT (an increase of 80 MT). This entails huge investment requirements, with an estimated 193 billion rupees.

---

[5] Ministry of Coal & Mines, Website: www.coal.nic.in

[6] TEDD 2001/2002, TERI, New Delhi

[7] Ministry of Coal & Mines, Website: www.coal.nic.in

[8] TEDDY 2001/2002, TERI, New Delhi

A new agenda

- Prior to the first move towards privatisation in 1993, the ownership of all mines was vested with the central Government with the exception of mines owned by private iron and steel companies. In 1993, The Coal Mines Nationalisation Act, 1973 was amended to permit power and cement plants also to mine coal for captive consumption.
- These industries can set up separate coal mining companies, provided the end user or its holding company holds a minimum of 26% equity in the coal mining company. All constituent bodies need to be incorporated under Indian Company law
- Construction of washeries on Build-Own-Operate (BOO) basis, has also been allowed.
- Pricing: the Colliery control Order, 1945 empowered the Government to fix the grade-wise and colliery-wise prices of coal. However, the prices of coal have since been deregulated and freed from government control. The sale of coal from a captive mine to the end-user will be exempted from the provisions of this order.

Foreign collaboration[9]

To meet country's growing demand for coal, foreign collaboration with the advanced coal producing countries are being considered for-

- Bringing in new technologies both in underground and opencast sectors for efficient management in the coal industry, skill development, training, etc.
- Seeking bilateral funds for importing equipment which is not manufactured in the country.
- Bringing foreign financial assistance to meet the investment requirements.

Scope of foreign investment in the coal sector

In projects where private Indian companies are setting up or operating power projects (which includes coal or lignite mines for captive consumption), foreign equity of up to 100% may be allowed, provided that the coal or lignite produced by them is meant entirely for captive consumption in power generation.

100% foreign investment in the equity of an Indian subsidiary of a foreign company or in the equity of an Indian company setting up of coal processing plants in India, may be allowed subject to the conditions that such an Indian subsidiary or the Indian company (a) shall not do coal mining, and (b) shall not sell the washed coal or sized coal from their Coal Processing Plants in the open market and shall supply the washed coal or sized coal from their Coal Processing Plants to the respective parties by sending raw coal to such Coal Processing Plants for washing or sizing.

The other private Indian companies engaged in exploration or mining of coal and lignite for captive consumption for production of iron and steel and production of cement may be allowed foreign equity up to 74%. Automatic approval of Reserve Bank of India for foreign direct investment in the equity of Indian Companies up to 50% in all the above cases may be allowed.

---

[9] Annual Reports 2001/2002, Government of India, Ministry of Coal & Mines, Department of Coal

However, foreign direct investment beyond 50% in the equities of the private Indian companies engaged in activities of the nature indicated above should require approval of the Foreign Investment Promotion Board.

Opportunities open to the foreign investors

Some of the opportunities open to the foreign investors are:-

- Coal washeries: The demand for washed coal is on the rise due to factors like increased per unit coal consumption for power generation, maintenance of power generation equipment, reduction in transportation costs and concern for the environment. Coal beneficiation should be cost-effective in situations where the coal is required to be transported for power units located at a distance of more than 1,000 km from the coal mine.
- Equipment supply: Indian coal producing companies need the introduction of the latest technology both in underground and open cast mining and the supply of equipment by foreign manufacturers.
- Engineering services: It is usual for Indian companies to utilise the services of external specialists for planning and designing mines and monitoring of projects. Two areas where foreign technical assistance is in demand are geotechnical assistance and hydrogeological evaluations of the deposit and mine production planning.
- Technology: The Government encourages investment by the private sector in adoption of clean coal technologies (CCT) like integrated gasification combined cycle (IGCC), pressurised fluidised bed combustion (PFBC), coal beneficiation and slurry combustion, and coal bed methane (CBM) exploitation.
- Underground mining assistance on the project for subsidence and strata control in multi-steam working in underground mines.

India's clean coal technology progress [10]

A good progress has been made in the technology for mining and beneficiation of coal. Growing environmental concerns and the need to improve conversion efficiency levels have led to keen interest in the development of CCTs in India. The technologies applicable are fluidised bed combustion (FBC), both bubbling and circulating, PFBC for combined cycle application, and IGCC.

In India, gasification and fluidised bed combustion are of greater importance as these processes can help generate power with considerable improvement in efficiency. Even using low quality coal abundantly found in the country,. IGCC technology compares favourably with other technologies. It is independent of the fuel quality. Depending on the type of gasifier, refinery residues, slurries and coal can be used. IGCC technology is also environmentally friendly. Pollutants like sulphur dioxide (SO_2) and oxides of nitrogen (NO_X) are reduced to very low levels, without the implementation of downstream plant components and without additives like limestone. The low NO_X values are achieved by dilution of the purified syngas with nitrogen from the air separation unit and by saturation with water.

---

[10] India's Clean Coal Technology progress
website: www.platts.comm/features//cleancoal/indiacct.shtml

Bharat Heavy Electricals Ltd (BHEL) has been working on IGCC technology and has developed an appropriate gasification process for Indian coal feedstock. The company's research has focused on air-blown fluidised bed gasification owing to the high mineral matter in the coal.

In the first phase, a pilot scale pressurized fluidised bed gasifier (PFBG) was established for evaluation of gasification of high-ash Indian coals. Based on the state-of-the-art gasifier technology, it was decided to first develop the moving bed gasification process, followed by fluidised bed technology. Following this, a combined cycle demonstration plant (CCDP) of 6.2MW capacity comprising a 4MW gas turbine and 2.2MW steam turbine was commissioned at BHEL Trichy during 1987. The coal gasification plant consists of a moving bed gasifier coupled with a wet gas clean-up system.

In the second phase, a 168t/d coal capacity PFBC demo plant was retro-fitted to the demonstration plant. The project was partly funded by USAID under the PACER programme, Pittsburgh Energy Technology Center (PETC) and IIT Chennai.

BHEL has also developed a 100MW commercial IGCC plant comprising a gas turbine of 58MW capacity and a PFBC to supply low Btu coal gas. Low-grade, high-ash coal, normally available for power generation was selected as the fuel. After accounting for the auxiliary power consumption, the net generation from IGCC will be about 93MW with an overall cycle efficiency of 38%.

Government Organisations

Ministry of Coal & Mines[11]

The Ministry of Coal has the overall responsibility of determining policies and strategies in respect of exploration and development of coal and lignite reserves, sanctioning of important projects of high value and for deciding all related issues. Under the administrative control of the ministry, these key functions are exercised through the public sector undertakings, namely, Coal India Ltd and its subsidiaries and Neyveli Lignite Corporation Ltd. Other than Coal India Ltd and Neyveli Lignite Corporation Ltd, the Ministry of Coal also has a joint venture with the Government of Andhra Pradesh called Singareni Collieries Company Ltd. The Government of Andhra Pradesh holds 51% equity and the Government of India hold 49% equity.

Functions and responsibilities[12]

The Ministry of Coal is responsible for development and exploitation of coal and lignite reserves in India. The subjects allocated to the Ministry under the Government of India (allocation of Business) Rules, 1961, as amended from time to time are as follows-

1. Exploitation and development of coking coal and lignite deposits in India.
2. All matters relating to production, supply, distribution and pricing of coal.
3. Development and operation of coal washeries other than those for which Ministry of Steel (Ispat Mantralaya is responsible).
4. Low temperature carbonisation of coal and production of synthetic oil from coal.
5. Administration of the Coal Mines (nationalisation) Act, 1973.
6. Administration of the Coal Mines (conservation and development) Act, 1974 (28 of 1974).
7. Administration of the Coal Mines Provident Fund and Miscellaneous Provisions Act, 1948 (46 of 1948) and all matters relating to the Coal Mines Labour welfare Organisation since abolished with effect from 1.10.1986.
8. Administration of all residual matters relating to the Coal Mines Labour Welfare Organisation since abolished with effect from 1.10.1986.
9. Administration of the rules under the Mines Act, 1952 (32 of 1952) for levy and collection of excise duty on coke and coal produced and despatched from mines.
10. Administration of Coal Bearing Areas (Acquisition and Development) Act, 1957 (20 of 1957)
11. Administration of Public Sector Enterprises dealing with coal and lignite.
12. Administration of Mines and Minerals (Regulation and Development) Act, 1957 (67 of 1957) and other Union laws in so far as the said Act and other Union laws in so far as the said Act and other Laws relating to coal and Lignite and use of sand for stowing purposes.
13. All business incidental to the administration of above activities including matters concerning the state Governments.

---

[11] Ministry of Coal & Mines website: www.coal.nic.in

[12] Ministry of Coal & Mines, website: www.coal.nic.in

Organisational structure[13]

At the Secretariat level, the Ministry is headed by a Secretary who is assisted by one additional secretary, three joint Secretaries (including the financial Advisor), one Project Advisor, seven Directors/ Deputy Secretaries, seven Under Secretaries, 11 section officers, one Desk officer, one Assistant Director (Official Language) and one Deputy Controller Accounts and their supporting staff **(See Annexure IV)**.

Foreign collaboration

To meet the country's growing demand for coal, co-operation and interaction with the advanced coal producing countries have been undertaken for the following reasons: -

a) bringing in new technologies both in underground and open cast mining sectors for efficient management, still development, training etc.
b) seeking bilateral funds for import of equipment, which are not manufactured in the country.
c) bringing foreign financial assistance to meet investment requirements.

Keeping these objectives in view, a Joint Working Group on Coal had been set up with France, Germany, Russia, Canada, Australia and China. The Department of Coal is also the nodal Department for the Joint Commission with Poland. An Indo-British Coal Forum has also been meeting regularly since 1997. The priority areas, inter-alia, include acquisition of modern underground mining technology, know-how for introduction of high productive opencast mining technology, working underground in difficult geological conditions, fire control and mine safety. Training of Indian personal as well as assimilation of the technology is also important considerations. With the liberalisation of the economy, greater thrust is being given to get foreign investments/assistance on the basis of cost competitiveness.
There is cooperation with Canada, France, United Kingdom, Poland, Russia, Germany, China, Australia, South Africa

Contact Information :
Ms Uma Bharati
Hon'ble Minister for Coal & Mines

Mr Ravi Shankar Prasad
Hon'ble Minister of State for Coal & Mines

Mr P K Misra, Secretary
Mr C D Arha, Additional secretary

---

[13] Ministry of Coal & Mines, website: www.coal.nic.in

Mr K P Verma, Adviser Projects
Mr Subrata Chaudhury, Director (Technical)

Ministry of Coal & Mines
Shastri Bhawan, Dr Rajendra Prasad Road
New Delhi 110 001

Coal India Ltd[14]

Coal India Ltd, the holding company with headquarters at Kolkata, is headed by a Chairman-cum-Managing Director. It is mainly responsible for laying down corporate objective, approving and monitoring performance of subsidiary companies in the fields of long-term planning, conservation, research and development, production, sales, finances, recruitment, training, safety, industrial relations, wages, material for all operational matters, commissioning and execution of new as well as on-going projects, man management, production, consumer satisfaction, etc. In addition, subsidiary companies perform related functions, such as maintaining liaison with concerned State Governments, acquisition of land, execution of welfare programmes, maintenance of safety standards, improvement of industrial relation etc. **(See Annexure II)**

In addition to the above functions, CIL directly controls the development and exploitation of the coal mines in the North-Eastern States, and the coal marketing network spread throughout the country. It contributes 87% of coal production in India, the largest company in the world in terms of coal production.

Functions

The broad functions are:

- Laying down policies
- Formulating long and short term plans
- Monitoring the functions of the subsidiary companies
- Laying down system and procedures.
- Assisting the subsidiary companies to achieve their objectives
- Co-ordinating with ministry of coal, ministry of railways, planning commission and other ministries.

Specific functions are:

- Pricing and distribution of coal
- Coal supply agreements
- Consumer services through regional offices
- Negotiations of wages
- Executive cadre control-recruitment, promotion/postings, pay/perks etc.
- Manpower planning-HRD

---

[14] Coal India Ltd, website: www.coalindia.nic.in/

- Procurement of heavy earth moving equipment and critical items of stores.
- Foreign collaboration
- Introduction of new technology
- R & D activities
- Mobilisation of resources-long term and short-term
- Accounting policies.

North Eastern Coalfields (NEC)[15]

North Eastern Coalfields, with its headquarters at Margherita, is a unit directly controlled by Coal India Ltd and is responsible for development and production of coal in the North Eastern states. The present mining activities are confined to Assam and Meghalaya. The area has large proven reserves of low ash, high calorific value coal but its high sulphur content prevents its coal to be used directly as metallurgical coal.

Contact Information:

The Chief General Manager
North Eastern Coalfields Ltd
Black Diamond Tower
G.S. Road, Guwahati,
Dispur, Assam- 781 005

Coal India and its subsidiaries

- Northern Coalfields Ltd Singrauli
- Central Mine planning & Design Institute Ltd, Ranchi
- Eastern Coalfields Ltd, Asansol
- Bharat Coking Coal Ltd, Dhanbad
- Central Coalfields Ltd, Ranchi
- Mahanadi Coalfields Ltd, Sambalpur
- South Eastern Coalfields Ltd, Bilaspur
- Western Coalfields Ltd, Nagpur
- North Eastern Coalfields, Guwahati

Contact Information

Mr N K Sharma, Chairman
Email: nksharma@cal2.vsnl.net.in
Mr D K Verma, Director (Finance)
Email: dirfcil@cal2.vsnl.net.in

---

[15] Annual Report 2001/2002, Government of India, Ministry of Coal & Mines, Department of Coal.

Mr Sashi Kumar, Director (Technical)
Email: dtcil@vsnl.net
Mr U P Singh
Dy. Chief Engineer (E&T), New Technology Division

Coal India Ltd
10 Netaji Subhas Road,
Kolkata, West Bengal 700 001
Tel: +91-33-248-8099/243-5147
Fax: +91-33-243-5316
www.coalindia.nic.in

Northern Coalfields Ltd[16]

Northern Coalfields Ltd was formed in April 1986 as a subsidiary of Coal India Ltd. Its headquarter is located at Singrauli, Distt. Sidhi (M.P.). Singrauli is connected by road with Varanasi (220 Km.) – a holy city on the banks of river Ganga, Rewa (206 Km.) – the estate of white tigers and Sidhi (100 Km.), the District headquarter town. The nearest railway station is Singrauli located on the Katni-Chopan branch line runs parallel to the northern boundary of the Coalfield. The nearest railway station for travelling directly to Delhi and Ranchi is Renukoot and is located on the Garhwa-Chopan line. Nearest airstrip is at Muirpur (60 Km.).

The area of Singrauli Coalfields is about 2202 sq.km. The coalfield can be divided into two basins, viz. Moher sub-basin (312 sq.km.) and Singrauli Main basin (1890 sq.km.). Major part of the Moher sub-basin lies in the Sidhi district of Madhya Pradesh and a small part lies in the Sonebhadra district of Uttar Pradesh. Singrauli main basin lies in the western part of the coalfield and is largely unexplored. The present coal mining activities and future blocks are concentrated in Moher sub-basin.

The exploration carried out by GSI/NCDC/CMPDI has proved an abundant resource of power grade coal in the area. This, in conjunction with easy water resource from Govind Ballabh Pant Sagar, makes this region an ideal location for high capacity pit head power plants. The coal supplies from NCL has made it possible to produce about 9015MW of electricity from pit head power plants of National Thermal Power Corporation (NTPC), Uttar Pradesh Rajya Vidyut Utpadan Nigam Ltd (UPRVUNL) and Renupower division of M/s. Hindalco and the region is now called power capital of India. The ultimate capacity of power generation of these power plants is 12,155MW and NCL is fully prepared to meet the increased demand of coal for the purpose. In addition, NCL is also supplying coal to power plants of Rajasthan Rajya vidyut utpadan nigam Ltd and Delhi Udyog Board (DUB).

NCL produces coal through mechanised opencast mines but its commitments towards environmental protection is total. It is one of very few companies engaged in mining activities, which has got ISO–14001 certification for its environmental systems.

---

[16] Annual report 2001/2002, Government of India, Ministry of Coal & Mines, Department of Coal

NCL, through its community development programmes, has significantly contributed towards improvement and development of the area. It is helping local tribal, non-tribal and project-affected persons in overall improvement of quality of their life through self-employment schemes, imparting education and providing health care.

Objective

- To ensure planned production of coal efficiently, matching with increasing demand of coal, which is the prime source of energy for the nation.
- To generate safety awareness amongst employees as also to create safe working culture.
- To ensure clean, green and pollution free environment at working places and also at surrounding areas.
- To ensure optimum capacity utilisation of men, machinery and available resources.
- To ensure cost control by developing cost consciousness.
- To ensure strict quality control for better consumer satisfaction.
- To ensure perfect manpower planning and also harness the best out of available human resource.
- To ensure improving the quality of life of work force through welfare measures showing genuine concern towards them.
- To be concerned for the community especially for the tribal and backward sections of the society residing in and around our mining project.
- To ensure rehabilitation of project affected people as per the guidelines outlined by Coal India Ltd and approved by the Ministry of Coal and also taking them into confidence to avail their full co-operation in achieving Corporate Objectives.
- To develop good work culture through disciplined contended and motivated workforce for achieving Organisational Objectives.

Contact Information:
Mr M K Sinha, Chairman & Managing Director
Email: cmdncl@nclhq.nic.in
Mr A Kalam, Director (Technical)
Email: a.kalam@nclhq.nic.in
Mr A Das, Director (Finance)
Northern Coalfields Ltd
P.O Singrauli, Dist. Sidhi
Madhya Pradesh- 486 886

Central Mine Planning & Design Institute Ltd (CMPDI)[17]

Central Mine Planning & Design Institute Ltd (CMPDI) is an ISO-9001 company, which holds the pre-eminent position as the India's largest consultancy organisation and is the market leader in an expanding earth resource sector. A key factor in this success has been the offering of full-range of services in the sphere of resource exploration & development, coal preparation, utilisation and management, coal/material handling arrangement, as well as engineering and environmental management.

---

[17] Central Mine Planning & Design Institute Ltd, website: http://cmpdi.nic.in

CMPDI was established in 1975 as a subsidiary of Coal India Ltd (a Government of India Enterprise) for rendering total consultancy services (i.e., from concept to commissioning) to Coal India Ltd and it's seven subsidiaries which contribute about 90% of the total coal production of the country.

Over the years, the initial experiences have effectively been extended to provide wide range of services right from coal exploration to its commercial application to different industrial sectors. Currently CMPDI, besides Coal India Ltd and it's seven subsidiaries, extends consultancy services to host of clients in India and abroad. The clients include Government and Private Entrepreneurs, United Nations Agencies, International Financial Institutions, etc.

CMPDI operates through its headquarters at Ranchi and seven regional institutes located at Asansol, Dhanbad, Ranchi, Nagpur, Bilaspur, Singrauli and Bhubaneshwar, which are geographically spread in six states of the country.

CMPDI is a registered consultant to the

- World Bank
- Asian Development Bank
- African Development Bank
- United Nations Development Programme.

CMPDI has a standing MoU with the following reputed international consultants to work together in the area of earth resource sector worldwide:

- IMCL, UK
- Giproshakht
- Monton Consulting GmbH, Germany
- Rheinbraun, Germany
- DMT, Germany

Consulting services

CMPDI, over the years, has built a strong well-knit organisation with highly skilled staffs that combines innovation and initiative with an accumulated experience in planning, implementation and management of projects, no matter what size or complexity.

It offers the following services:

- *Exploration and Resource Evaluation*
    - Topographical evaluation
    - Geological, geo-technical, geo-physical evaluation
    - Coring & non-coring drilling
    - Hydrogeological studies
    - Remote sensing

- *Planning and design*
  - Open pit and underground mines
  - Coal and mineral beneficiation and utilisation
  - Mine services and infrastructure
  - Detailed designing and equipment specification
- *Contract Management*
- *Environment Management*
- *Market study and demand forecasting*
- *Engineering and construction management*
- *Ventilation and gas survey*
- *Controlled blasting*
- *Mine support design*
- *Rock testing*
- *Non – destructive testing of equipment and accessories*
- *Equipment and material inspection*
- *Coal and coke analysis*
- *Research, development and field trial*
- *Technical & management training and HRD*

Beneficiation and utilisation

Coal beneficiation

CMPDI offers complete consultancy services for coal washeries and mineral beneficiation as well as modernisation of existing plants. Services offered are:

- Preparation of bankable project report
- Project management consultancy and system design
- Pre-engineering design drawings
- Supervision during construction
- Performance acceptance test
- Turnkey execution of beneficiation plants
- Pilot scale studies and trials

Coal utilisation

CMPDI has patented its own technology through development of Special Smokeless Fuel (SSF), the domestic coke. Services offered are:

- Design, know-how, construction and commissioning of ssf, pellet and briquette plants
- Trouble shooting in coal/lignite based power plants relating to combustion
- Trouble shooting in old coke ovens
- Analysis and assessment of characteristics of coal and minerals.

Contact Information:
Mr B Akala, Chairman & Managing Director
CMPDI
Gondwana House,
Kanke Road
Ranchi, Jharkhand
Tel: +91-0651-230347/230015/231631/232067
Email: cmpdil@giasbm01.vsnl.net.in

Bharat Coking Coal Ltd (BCCL)[18]

Bharat Coking Coal Ltd (BCCL) is a Public Sector Undertaking engaged in mining of coal and allied activities. It occupies an important place in as much as it produces bulk of the coking coal mined in the country. BCCL meets almost 50% of the total prime coking coal requirement of the integrated steel sector. It also supplies substantial quantity of coal to the pig iron sector and bulk of the coal requirement of the power station in the Northern region.

BCCL's area of operation falls in Jharia Coalfield and in a part of Ranigaunj Coalfield in the Stat of Bihar. Its activity extents into a small area in West Bengal also wherein it operates two of its coal mines. Its area of operations covers 270 sq.kms of the Jharia Coalfields and 32 sq.kms in the Ranigaunj Coalfield.

Contact Information:
Mr B N Pan, Chairman & Managing Director
Mr N K Bazaj , Director (Finance)
Mr J Kumar, Director (Technical) Operation
Bharat Coking Coal Ltd
Koyla Bhawan
Dhanbad, Jharkhand
Tel: +91-326-263023//263030-33/2640885-86
Fax: +91-326-262227
Email: rch_bccl@sancharnet.indte.vsnl.net.in

South Eastern Coalfields Ltd (SECL)[19]

SECL with headquarters at Bilaspur (MP) was incorporated on 28.11.1985. The company covers Korba (East), Korba (West), Baikunthpur, Chirimiri, Hasdeo, Sohagpur, Jamuna-kotma and Johilla areas in Madhya Pradesh. Despite separation of coalfields in Orissa from its jurisdiction, SECL continues to be one of the leading coal producers among the subsidiaries of CIL.

---

[18] Bharat Coking Coal Ltd, website: http://bccl.nic.in

[19] Annual Report 2001/2002, Government of India, Ministry of Coal & Mines, Department of Coal.

Contact Information:
Mr M N Jha, Chairman & Managing Director
Email: cmdsecl@sancharnet.in
Mr N K Singh, Director (Technical) Operation
Email: dtpsecl@sancharnet.in
Mr D Basu, Director (Finance)
Email: dfsecl@sancharnet.in

South Eastern Coalfields Ltd
Seepat Road, P B No. 60
Bilaspur, Chhattisgarh- 495 001
Tel: +91-7752-42672-800/42985
Fax: +91-7752-23306

Western Coalfields Ltd (WCL)[20]

Western Coalfields Ltd (WCL) is one of the eight Subsidiary Companies of Coal India Ltd (CIL). The Company incorporated under the Companies Act, 1956 has its registered office at Coal Estate, Civil Lines, Nagpur–440001.

The Company contributes about 11% of the national coal production (35MT/yr). It has mining operation spread over the states of Maharashtra (in Nagpur, Chandrapur & Yeotmal Districts) and Madhya Pradesh (in Betul and Chhindawara Districts).

The Company is a major supplier of coal to the industries located in Western India in the States of Maharashtra, Madhya Pradesh, Gujarat and also in Southern India in the States of Andhra Pradesh, Tamil Nadu, Karnataka and Kerala. A large number of Power Houses under Maharashtra-Madhya Pradesh-Gujarat and Karnataka - Electricity Boards are major consumers of its coal along with cement, steel, chemical, fertiliser, paper and brick Industries in these states.

Contact Information:
Mr S V Chaoji, Chairman & Managing Director
Email: wclcmd@nagpur.dot.net.in
Director (Technical) (Operation)
Email: wcldt@nagpur.dot.net.in
Mr P S Bhattacharya, Director (Finance)
Email: wcldf@nagpur.dot.net.in

---

[20] Western Coalfields Ltd, Website: www.westerncoal.nic.in

Western Coalfields Ltd
Civil Lines, Nagpur
Maharashtra
Tel: +91-712-511381-3/510384-5
Fax: +91-712-525302

Eastern Coalfields Ltd (ECL)[21]

ECL has its headquarters at Sanctoria, West Bengal. It covers the Raniganj coalfield in West Bengal and Mugma and Rajmahal. coalfields in Bihar. This company produces coal to meet the requirement of locomotive industry and other industries, which require relatively higher grades of coal.

Contact Information:
Mr A Mehta, Chairman & Managing Director
Email: ecltd@dte.vsnl.net.in
Mr A Mukhopadhyay, Director (Technical)(Operation)
Email: ecldtop@sanchernet.in
Mr M L Sethia, Director (Finance)

Eastern Coalfields Ltd
Sanctoria, Dishergarh
West Bengal- 713333
Tel: +91-341-520414/5
Fax: +91-341-202113

Central Coalfields Ltd (CCL)[22]

CCL has its headquarters at Ranchi in Jharkhand and covers Bokaro, Ramgarh, Giridih, North and south Karanpura coalfields of Bihar. Apart from several nationalised mines; it owns most of the mines of the former National Coal Development Corporation Ltd. The company produces medium coking coal (raw and washed), non-coking coal, soft coke and hard coke.

Contact Information:
Mr M K Thapar , Chairman & Managing Director
Email: rch_cclcmd@sancharnet.in
Central Coalfields Ltd
Darbhanga House, Cutchery Road,
Ranchi – 834001
Jharkhand

---

[21] Annual Report 2001/2002, Government of India, Ministry of Coal & Mines, Department of Coal.

[22] Annual Report 2001/2002, Government of India, Ministry of Coal & Mines, Department of Coal.

Mahanadi Coalfields Ltd [23]

Mahanadi Coalfields Ltd with its headquarters at Sambalpur, was incorporated as another subsidiary company of CIL on 3.4.1992. Its areas of jurisdiction comprise Talcher and IB valley coalfields in Orissa.

Contact Information:
Mr R K Chechani, Chairman & Managing Director
Mr S P Singh, Director (Technical) (Operation)
Mr S K Basu, Director (Finance)

Mahanadi Coalfields Ltd
Ananda Bihar, Burla
Sambalpur
Orissa.

Singareni Collieries Company Ltd (SCCL) [24]

SCCL is a joint undertaking of the Government of Andhra Pradesh and the Government of India. The equity capital is in the ratio of 51:49 between Government of Andhra Pradesh and the Central Government respectively. The Headquarters of the company is at Kothagudem in Andhra Pradesh.

Contact Information:
Mr A P V N Sharma
Chairman & Managing Director
The Singareni Collieries Co Ltd
Meher Manzil, Red Hills
Khairatabad, P B No. 18
Hyderabad 500 004

Mr D L R Prasad
General Manager (Corporate Planning & Projects)
Mr R Y Reddy
Chief General Manager (Quality Management)

---

[23] Annual Report 2001/2002, Government of India, Ministry of Coal & Mines, Department of Coal.

[24] Annual Report 2001/2002, Government of India, Ministry of Coal & Mines, Department of Coal.

The Singareni Collieries Co. Ltd
Kothagudem Collieries-507 101
Khammam District,
Andhra Pradesh.
Tel: +91-08744-45646
Fax: +91-08744-42305

Ministry of Power[25]

The Ministry of Power started functioning independently with effect from 2nd July 1992. Earlier it was known as the Ministry of Energy comprising the Department of Power, Coal and Non-Conventional Energy Sources.

Electricity is a concurrent subject at Entry 38 in List III of the Seventh Schedule of the Constitution of India. The Ministry of Power is primarily responsible for the development of electrical energy in the country. The Ministry is concerned with perspective planning, policy formulation, processing of projects for investment decision, monitoring of the implementation of power projects, training and manpower development and the administration and enactment of legislation in regard to thermal, hydro power generation, transmission and distribution.

The Ministry of Power is responsible for the administration of the Indian Electricity Act, 1910 and Electricity (Supply) Act, 1948, Electricity Regulatory Commission Act, 1998 and to undertake such amendments to these Acts, as may be necessary from time to time, in conformity with the Governments policy objectives.

The Ministry of Power is mainly responsible for evolving general policy in the field of energy. The main items of work dealt with by the Ministry of Power are as below:

- General Policy in the Electric Power Sector and issues relating to energy policy. (Details of short, medium and long-term policies in terms of formulation, acceptance, implementation and review of such policies, cutting across sectors, fuels, regions and cross country flows).
- All matters relating to hydroelectric power (except mini micro hydel projects of and below 25MW capacity and Geo-thermal energy) and thermal power and Transmission System Network.
- Research, development and technical assistance relating to hydroelectric and thermal power and transmission system network.
- Administration of the Indian Electricity Act, 1910 (9 of 1910) and the Electricity (Supply) Act, 1948 (54 of 1948)/ERC Act 1998.
- All matters relating to Central Electricity Authority, Central Electricity Board and Central Electricity Regulatory Commission.
- Rural Electrification, power schemes in Union territories and issues relating to power supply in the States and Union territories.

---

[25] Annual Report 2001/2002, Ministry of Power, Government of India

- Matters relating to the following Undertakings/Organisations, etc.
    - *The Damodar Valley Corporation.*
    - *Bhakra Beas Management Board (except irrigation matters).*
    - *National Thermal Power Corporation Ltd.*
    - *National Hydro-electric Power Corporation Ltd.*
    - *Rural Electrification Corporation Ltd.*
    - *North Eastern Electric Power Corporation Ltd.*
    - *Power Grid Corporation of India Ltd.*
    - *Power Finance Corporation Ltd.*
    - *Tehri Hydro Development Corporation.*
    - *Nathpa Jhakri Power Corporation.*
    - *Central Power Research Institute.*
    - *National Power Training Institute.*
    - *Energy Management Centre.*
- Other Public Sector Enterprises concerned with the subject included under this Department except such projects as are specifically allotted to any other Ministry/Department.
- All matters concerning Energy Conservation and Energy Efficiency pertaining to Power sector.

Organisations Under Ministry of Power

In all technical and economic matters, Ministry of Power is assisted by the Central Electricity Authority (CEA) constituted under the Electricity (Supply) Act, 1948.

Badarpur Management Contract Cell (BMCC), a subordinate office of this Ministry, is responsible for administering the Badarpur Thermal Power Station (BTPS) Management Contract between the Government of India and NTPC.

The construction and operation of generation and transmission projects in the Central Sector are entrusted to central Sector Power Corporations, viz.

- The National Thermal Power Corporation (NTPC),
- The National Hydro Electric Power Corporation (NHPC),
- The North Eastern Electric Power Corporation (NEEPCO) and
- The Power Grid Corporation of India Ltd (PGCIL).

The Powergrid is responsible for all the existing and future transmission projects in the Central Sector and also for the formation of the National Power Grid.

Two Joint Venture Power Corporations namely, Nathpa Jhakri Power Corporation (NJPC) and Tehri Hydro development Corporation (THDC) are responsible for the execution of the Nathpa Jhakri Power Project in Himachal Pradesh and projects of the Tehri Hydro Power Complex in Uttar Pradesh respectively.

Two statutory bodies i.e., the Damodar Valley Corporation (DVC) and the Bhakra Beas Management Board (BBMB) are also under the administrative control of the Ministry of Power.

Programmes of Rural Electrification are provided financial assistance by the Rural Electrification Corporation (REC) under the Ministry of Power.

The Power Finance Corporation (PFC) provides term-finance to projects in the power sector.

Further, the autonomous bodies (societies) i.e., Central Power Research Institute (CPRI), the National Power Training Institute (NPTI) and the Energy Management Centre (EMC) are also under the administrative control of the Ministry of Power.

Organisational set-up

The Minister of Power, Minister of State of Power, Secretary (Power) is assisted by a Special Secretary, Additional Secretary and five Joint Secretaries, including the Financial Adviser. There are five Wings in the Ministry of Power, each headed by an Additional/Joint Secretary (See **Annexure III**). These are:

(a) Transmission and Energy Conservation.
(b) Hydel, Reforms & Restructuring.
(c) Administration; Co-ordination; Operations Monitoring; Thermal.
(d) Internal Finance.
(e) Investment Promotion Cell ,Power Finance Corporation, Power Trading Corporation & Rural Electrification Corporation
(f) Policy & Planning, External Assistance, Training & Research and Vigilance & Security.

Contact Information:

Mr Anant Gangaram Geete is the Minister of Power
Mrs Jayawanti Mehta is the Minister of State of Power
Mr R V Shahi, Secretary (Power)

Ministry of Power
Government of India
Sharm Shakti Bhawan, Rafi Marg
New Delhi 110 011

Bureau of Energy Efficiency (BEE)[26]

The mission of Bureau of Energy Efficiency (BEE) is to 'institutionalise' energy efficiency services, enable delivery mechanisms in the country and provide leadership to energy efficiency in all sectors of the country. The primary objective would be to reduce energy intensity in the economy.

The broad objectives of BEE are as follows:

- To exert leadership and provide policy framework and direction to national energy conservation and efficiency efforts and programs.
- To coordinate energy efficiency and conservation policies, and programs, and take it to the stakeholders.

---

[26] Bureau of Energy Efficiency (Ministry of Power) Website: www.bee-india.com

- To establish systems and procedures to measure, monitor and verify energy efficiency results in individual sectors as well as at a macro level.
- To leverage multi-lateral and bi-lateral and private sector support in implementation of Energy Conservation Act and efficient use of energy and its conservation programs.
- To demonstrate delivery of energy efficiency services as mandated in the EC bill through private-public partnerships.
- To interpret, plan and manage energy conservation programs as envisaged in the Energy Conservation Act.

Contact Information:
Mr Shashi Shekhar, Director General
Bureau of Energy Efficiency
118, Ashirwad Complex, D1, Green Park
New Delhi 110 016
www.bee-india.com

National Thermal Power Corporation (NTPC)[27]

National Thermal Power Corporation Ltd (NTPC) is the largest thermal power generating company of India. This is a public sector company, wholly owned by the Government of India, which was incorporated in 1975 to accelerate power development in the country. Within a span of 26 years, NTPC has emerged as a truly national power company, with power generating facilities in all the major regions of the country. Based on 1998 data carried out by Datamonitor UK, NTPC is the 6th largest in terms of thermal power generation and the second most efficient in terms of capacity utilisation amongst the thermal utilities in the world.

NTPC's core business is engineering, construction and operation of power generating plants and also provides consultancy to power utilities in India and abroad. The Installed capacity of NTPC is 20,092MW through its 13 coal based (15980MW), seven gas based (3955MW) and three Joint Venture (JV) Projects (157MW). NTPC acquired 50% equity of the Steel Authority of India Ltd, Power Supply Corporation Ltd (SPSCL). This JV company operates the captive power plants of Durgapur (120MW), Rourkela (120MW) and Bhilai (74MW). NTPC is also managing Badarpur thermal power station (705MW) for the Government of India.

NTPC's share on 31st March 2002 in the total installed capacity of the country was 19.2% and it contributed 25.8% of the total power generation of the country during 2001-02.

NTPC has set new benchmarks for the power industry both in the area of plant construction and operations. It is providing power at the cheapest average tariff in the country. With its experience and expertise in the power sector, NTPC is extending consultancy services to various organisations in the power business. NTPC has entered into a joint venture with Alstom, Germany for renovation and modernisation of power plants in India.

---

[27] National Thermal Power Corporation, Website: www.ntpc.co.in

A "Centre for Power Efficiency and Environment Protection" (CENPEEP) has been established in NTPC with the assistance of United States Agency for International Development (USAID). CENPEEP is an efficiency oriented, eco-friendly and eco-nurturing initiative, a symbol of NTPC's concern towards environmental protection and continued commitment to sustainable power development in India.

Contact Information
Mr C P Jain
Chairman & Managing Director
National Thermal Power Corporation Ltd
NTPC Bhawan, Scope Complex
Lodhi Road, New Delhi 110 003
Tel: +91-11-4367073/4360044/4363482
Fax: +91-11-4363050

Mr Avdesh Kumar
Senior Manager (Environment Management)
NTPC, NTPC Bhawan, Core 7
Scope Complex, Lodhi Road, New Delhi-03

Mr S C Deo Sharma
General Manager (CENPEEP)
National Thermal Power Corporation Ltd
Centre for Power Efficiency & Environmental Protection
R & D Building, A-8A, Sector – 24
NOIDA- Distt, G B Nagar- 201 301
Uttar Pradesh

Mr Y R Shrivastava
Dy. General Manager (Environment Management)
NTPC, NTPC Bhawan, SCOPE Complex
Core-5, 3rd Floor, 7 Institutional Area
Lodhi Road, New Delhi- 110 003
Tel: +91-11-4369518
Fax: +91-11-43620600/4361018

General Manager (JV & CW)
NTPC Corporate Center
Core - 6, Seventh Floor,
SCOPE Complex Lodhi Road,
New Delhi - 110 003

Tel: +91-11-436-5088
Fax: +91-11-436-1903, 436-3064, 436-1781

ntral Power Research Institute (CPRI)[28]

The Central Power Research Institute (CPRI) was established in Bangalore by the Government of India in 1960. It became an Autonomous Society in 1978 under the aegis of the Ministry of Power, Government of India. The main objective of setting up of the Institute was to serve as a National Laboratory for undertaking applied research in electric power engineering besides functioning as an independent National Testing and Certification Authority for electrical equipment and components to ensure reliability and improve, innovate and develop new products.

Objectives

- To serve as a national centre for applied research in electrical power engineering.
- To function as an independent and impartial authority for certification and testing of electrical equipment manufactured in the country for quality assurance.
- To perform tests for product development
- To offer consultancy on problems referred by utilities and industries.
- To undertake sponsored research programmes on subjects of interest to industries & power utilities.

The Institute is headed by a Director General and has several research laboratories and testing facilities and employs about 280 qualified Scientists and Engineers and other supporting staff. The Head Office of the Institute is in Bangalore and its other units are located at Bhopal, Hyderabad, Nagpur, Ghaziabad, Thiruvananthapuram and Raichur.

Contact Information:
Dr Sachchidananad, Director General
Email: dgcpri@powersearch.cpri.res.in

Central Power Research Institute
New BEL Road, P B No. 8066
Bangalore 560 080

Tel: +91-80-3602457/3601263/3601755/3602339
Fax: +91-80-3601213

---

[28] Annual Report 2001/2002, Ministry of Power, Government of India

Power Finance Corporation Ltd (PFC)[29]

The Power Finance Corporation Ltd (PFC) was incorporated in 1986 under the Companies At, 1956. The mission of PFC is to function as the prime Development Financial Institution dedicated to the growth and overall development of the power sector. The borrower-portfolio of PFC comprises the State Electricity Boards (SEBs), State Generation Corporations (SGCs), and Municipality-run power utilities besides central, private, joint sector and co-operative sector power utilities. The funds provided by the corporation are in the nature of additionality to Central Plan Allocation (in respect of SEBs, etc.) and based on the merits of the individual projects.

Contact Information:

Dr K K Govil
Director (Projects)
Power Finance Corporation of India
3rd Floor, Chandralok Building
36, Janpath, New Delhi 110 001

---

[29] Annual Report 2001/2002, Ministry of Power, Government of India

Ministry of Heavy Industry and Public Enterprises

Bharat Heavy Electricals Ltd[30]

Bharat Heavy Electricals ltd (BHEL) is the largest engineering and manufacturing enterprise of its kind in India and is one of the leading international companies in the field of power equipment manufacture. The first plant of BHEL was set up at Bhopal in 1956, which signalled the dawn of the heavy electrical industry in India. In the early sixties, three more major plants were set up at Haridwar, Hyderabad and Tiruchirappalli, that form the core of the diversified product range, systems and services that BHEL offers today. BHEL range of services extends from project feasibility studies to after-sales-service successfully meeting diverse needs through turnkey capability. The company has 14 manufacturing units, four power sector regional centres, eight service centres and 18 regional offices besides project sites spread all over India and abroad. The company has formed a Strategic Business Unit for Ceramics at Bangalore. BHEL is today the largest engineering and manufacturing enterprise of its kind India, with a well-recognised track record of performance, making profits continuously since 1971-72 and paying dividends since 1976-77.

BHEL manufactures over 180 products under 30 major product groups and caters to core sectors of the Indian economy viz., Power Generation and Transmission, Industry, Transportation, Telecommunication, Renewable Energy, etc. The quality and reliability of its products is due to the emphasis on design, engineering and manufacturing to international standards by acquiring and adapting some of the best technologies from leading companies in the world, together with technologies developed in its own R&D centres. BHEL has acquired certifications to both ISO 9000 and ISO 14000 standards for its operations and has adopted the concepts of Total Quality Management. BHEL has adopted Occupational Health and Safety Standards as per OHSAS 18001. Two of its divisions have acquired certification to OHSAS 18001 standard and the other units are in the process of acquiring the same.

BHEL has

- Installed equipment for over 62,000MW of power generation-for utilities, captive and industrial users.
- Supplied 2,00,000 MVA transformer capacity and sustained equipment operating in Transmission & Distribution network up to 4 – AC & DC.
- Supplied over 25, 000 Motors with Drive Control system to power projects, petrochemicals, refineries, steel, aluminium, fertiliser, cement plants etc.
- Supplied Traction electric's and AC/DC locomotives to power over 12,000km odd railway network
- Supplied over one million valves to power plants and other industries.

---

[30] Bharat Heavy Electricals Ltd, Website: www.bhel.com

BHEL's operations are organised around three business sectors, namely Power, Industry (including Transmission, Transportation, Telecommunication & Renewable Energy) and International Operations. This enables BHEL to have a strong customer orientation, to be sensitive to his needs and respond quickly to the changes in the market.

BHEL's vision is to become a world class, innovative, competitive and profitable engineering enterprise providing total business solutions. The company is striving to give shape to this vision and fulfil the expectations from BHEL as a ' Navratna'[31] Company.

The greatest strength of BHEL is its highly skilled and committed people. Every employee is given an equal opportunity to develop himself and improve his position. Continuous training and retraining, career planning, a positive work culture and participative style of management have engendered development of a committed and motivated work force leading to enhanced productivity and higher levels of quality.

Research & Development at BHEL

To remain competitive and meet customers' expectations, BHEL lays great emphasis on the continuous upgrade of products and related technologies, and development of new products. BHEL's commitment to advancement of technology is reflected in its involvement in the development of futuristic technologies like fuel cells and superconducting generators. BHEL's investment in R&D is amongst the largest in the corporate sector in India. Products developed in-house during the last five years contributed about 9% to the revenues in 2000-2001.

Some of the recent Engineering and R&D accomplishments are listed below: -

- CFBC boilers with lignite as fuel.
- Dense phase fly ash handling system.
- Optimised electrostatic precipitators with microprocessor based controls.
- Corex gas fired boiler
- High-pressure bagasse fired boilers for sugar industry.
- Low NO_X oil burners.
- Pressurised fluidised bed gasifier for IGCC applications.
- Aerofoil bladed primary air fan.
- 250MW axially mounted condenser.
- Boiler feed pumps for combined cycle power plants.
- Acoustic enclosure for boiler feed pumps.
- Two cylinder 150MW reheat steam turbine with single flow low-pressure module.
- A new series of 15-20MW steam turbines.
- Digital governor for hydro turbines.
- High efficiency Pelton turbine profile.
- 170MVA air-cooled gas turbine generator.
- Advanced man-machine interface for control of power plants.

---

[31] Navratna: Group of 9 profit-making public sector companies

- Automatic plant start-up system for combined cycle power plants.
- Bulk loading automation system for petroleum product depots.
- Variable frequency drives for induced draft fans and boiler feed pumps.
- 3175kW, 11kV, 18-pole vertical SPDP motor.
- 5000/4600 h.p dual voltage AC/DC locomotives
- 1400 h.p. alternator for Diesel Electric Multiple Units
- Switched reluctance motor for electric vehicles
- Light weight high power traction motors for high speed diesel electric locomotives
- High power traction motors for AC Electric Multiple Units
- Overhead equipment recording cum test car for traction lines
- Microprocessor based control systems for High Voltage Direct Current (HVDC)
- 36kV gas insulated substation with 25kA current rating, including double bus bar configuration
- 45kV gas insulated substation
- Spark gap for 400kV series compensation schemes
- 160 and 210 N ceramic disc insulators for High Voltage Direct Current transmission systems
- Low-tension thyristor switched capacitor for shunt compensation.

Coal research facilities at BHEL

Coal Research group of BHEL is primarily engaged in the development of equipment and systems for clean coal technologies.

Major activities/achievements:

- Carried out feasibility and techno-economic studies and mathematical modelling for advanced power cycles. Over thirty reports have been prepared
- Pressurised fluidised bed combustion (PFBC). Extensive studies have been carried out in the area of fluidisation and heat transfer using a 440mm PFBC pilot plant. Facilities available for further development.
- Pressurised fluidised bed gasification (PFBG). Development facilities of 100mm diameter, 200mm and 440mm diameter are available to carry out gasification studies. Based on the work carried out here, a 168tpd. PFBG was developed and integrated with 6.2MW$_e$ IGCC test facility at BHEL Trichy unit. Also associated cold model fluidisers are available for fluidisation as well as scale up studies.
- A pilot plant for high-temperature and high-pressure granular bed filter established. Considerable data generated to integrate with advanced power cycles.
- Other areas of activities are reformation of methanol, pneumatic solid transportation, characterisation of lime and dolomite and ongoing development of dynamic classifier for bowl mills.

Earlier this group had designed a moving bed gasifier, which was used with a 6.2MW$_e$ IGCC demonstration plant. This plant was first of its kind in Asia and fourth in the world. This group has also sold the design of a combined PFBC and PFBG test facility to ESKOM of South Africa.

Contact Information:
Mr K G Ramachandran
Chairman & Managing Director
Bharat Heavy Electricals Ltd
BHEL House, Siri Fort
New Delhi-110 049
Tel: +91-11-6001001/1010
Fax: +91-11-6493021/2534
Email: cmdkgr@asiad.bhel.co.in

Mr S Balagurunathan
General Manager (Incharge)
Corporate Research & Development
Division, BHEL
Vikasnagar, Hyderabad 500 093
Andhra Pradesh

Heavy Engineering Corporation Ltd (HECL)[32]

Heavy Engineering Corporation Ltd (HECL) was established in 1958 as the largest Integrated Engineering Industrial Complex in India with excellent design, engineering, and manufacturing base. The company is engaged in the manufacture and supply of capital equipment, machine tools and spares needed for the core sector industries Steel, Coal/Mining, Cement, Power.

Contact Information:

Head Office
Ranchi:
Heavy Engineering Corporation Ltd
P.O. Dhurwa
Ranchi-834 004 (India)
Fax: +91-651 408571
Tel: +91 651 408504
Email: rch_hecmktg@sancharnet.in
hec@inranchi.com

---

[32] Heavy Engineering Corporation Ltd, Website: http://www.hecltd.com/

Branch Office (New Delhi)
Heavy Engineering Corporation Ltd
Bajaj House (3rd Floor)
97, Nehru Place
New Delhi-110 019 (India)
Fax: +91-11-6431781
Tel: +91-11-6431753
Email: hecltd@nda.vsnl.net.in

Ministry of Science and Technology

Council of Scientific & Industrial Research (CSIR)[33]

The council of Scientific & Industrial Research (CSIR) constituted in 1942 by a resolution of the then Central Legislative Assembly, is an autonomous body registered under the Registration of Societies Act XXI of 1860.

It is a national R&D organisation providing scientific industrial research inputs for India's economic growth and human welfare. The CSIR system has a country wide network of 40 laboratories, 80 field stations manned by nearly 22,000 dedicated people. The management of the organisation is carried out by the Director General under the guidance and direction of overarching bodies namely CSIR Society, Governing Body, Advisory Board, five Technical Advisory Board, and at the laboratory level by Directors with the advice and guidance from respective Research Councils (RC's)

The headquarters assists the Director General in the management of CSIR. These departments are located within the headquarters.

- R&D Planning & Business Development Division (RPBD)
- International Science & Technology Affairs Directorate (ISTAD)
- Human Resource Development Group (HRDG)
- Societal & Technological Missions Division (STMD)
- Intellectual Property Management Division (IPMD)
- Unit for Science Dissemination (USD)

Major programmes on cleaner coal technology

- Efforts to establish the techno-economic credentials of IGCC technology for power generation with high ash coals.
- Techno-economic evaluation of globally available IGCC technologies and their suitability for Indian conditions and high ash Indian coals.
- Formulation of national collaborative programme for establishing pilot power generation plant in association with BHEL, Ministry of Power, Department of Coal, National Thermal Power Corporation, Central Electricity Authority etc.

Contact Information:
Dr Ragunath A Mashelkar
Director General
Council of Scientific & Industrial Research
2, Rafi Marg, New Delhi-01
Tel: +91-11-3710472/3717053
Fax: +91-11-3710618
Email: dgcsir@csir.res.in

---

[33] Council of Scientific & Industrial Research (CSIR) http://www.csir.res.in

Central Fuel Research Institute (CFRI)[34]

Central Fuel Research Institute, founded in 1946, has completed its Golden Jubilee on the 17th November 1996. Over the last 50 years the Institute has been carrying out basic research and R&D activities on coal and established itself as premier research institution on coal in the world, acknowledged as a ISO 9001 Institute, the first national laboratory of CSIR to receive such recognition.

The activity, expertise and laboratory facilities of the Institute cover all areas of Coal Science and Technology, viz: -

- Quality Evaluation and Resource Assessment
- Basic Research
- Coal Preparation and Beneficiation
- Coal Carbonisation
- Coal Combustion
- Coal Gasification
- Conversion of Liquid Fuels
- Coal Chemicals
- Briquettes and Shaped Fuels
- Carbon Products
- Clean Coal Technology
- Waste Utilisation
- Efficient Energy system
- Environmental Impact Assessment
- Sampling, Testing, Analyses, Technical Information Services and Consultancy
- Human Resources Development-education & Training

Contact Information

Director,
Central Fuel Research Institute
P.O. FRI, Dhanbad-828 108
Bihar

Central Mining Research Institute[35]

Central Mining Research Institute (CMRI), Dhanbad is a national laboratory of council and scientific and Industrial Research(CSIR) (comes under the Ministry of Science and Technology, Government of

---

[34] Central Fuel Research Institute, Website: http://www.coalindia.com/organizations/institutes/cfri.htm

[35] Central Mining Research Institute,
Website: http://www.coalindia.com/organizations/institutes/cmri.htm

India) . This laboratory was established on May 10, 1956 for carrying out R&D work in the field of mining and cognate subject to make mining safe, productive, environmentally friendly and economical as well as reduce health hazards to miners and environmental pollution due to mining and associated industrial activities. The primary mission of the Institute is to provide scientific and technical input to mineral industry with a view to optimise mining technology for better safety economy, conservation and environmental management. Since the inception of the Institute about 40 years ago the activities of CMRI has undergone change, due to the adoption of open market policy and globalisation by the Government of India. Changes are also due to a change of total mining scenario with the added dimensions for safety in mines, environmental management and eco-friendly mining operations, computer applications and higher productivity in mines and use of advance mining technology for both large and small scale mines.

Apart from mining and allied fields, the Institute diversified and extended its activities in the areas of development of underground space technology and technology for the construction of caverns, hydel projects, dams and tunnels. This Institute is gaining continuous momentum demand which is gearing up day by day.

Main areas of development

Developing Mining Technologies for the Exploitation of Complex Coal Deposits.
Developing Total Packages for Optimum Exploitation of Mineral
Deposits Using Improved Techniques.
Numerical Modelling of Mechanical Behaviours Rock Excavation and Computer Application in Mines, Tunnels and underground Caverns
Planning and Design from Stability Point of View.
Development of Methods and Devices to Improve safety
Performance and Safety Standards in Mines
Environmental Management, Reclamation and Development of Innovative Eco-Friendly Mining Practices.

Contact Information:

Director
Central Mining Research Institute
Barwa Road, Dhanbad- 826 001
Email: Director@cscmri.ren.nic.in
Tel: +91-326-202589/202815/202930
Fax: +91-326-202429/205028

Indian Institute of Chemical Technology (IICT)[36]

Indian Institute of Chemical Technology (IICT) offers globally competitive, environmentally friendly technologies for Drugs, Agrochemicals, Organic and Inorganic Chemicals, Catalysis, Polymer Coatings, Adhesives, Oils and many other technologies.

IICT also offers knowledge-based services in Analytical Testing & Characterisation, Process Upgradation/Restandardisation, New molecule/Product development, Process Safety studies, Design/Engineering & Project Viability studies (See **Annexure V**).

Coal and Gas Based Technologies

Utilisation of Indian low-grade coals R&D programs pursued are:

- Utilisation of low grade coals for power generation by IGCC
- Use of coal derived gas in iron ore reduction for making sponge iron.
- Use of coal gasification for chemicals to the medium scale industries (CO, Syngas, Methane, Acetylene etc.)
- Laboratory scale studies for development of gasification technologies based on circulating fluidised bed and agglomerating fluidised techniques
- Gas purification and separation.

Contact Information:

Dr K V Raghavan
Director

Dr K B S Prasad
Area, Leaders (Coal & Gas Technologies)

Mr G Sampath Kumar
Business Development

Dr L N Kota
Overseas Collaboration

Dr M Pardha Saradhi
Area Cooridinators, Coal and Gas based chemical sciences
Indian Institute of Chemical Technology
Council of Science & Industrial Research
Hyderabad-500 007
Tel: 91-40-7193943, +91-40-7193030
91-11-7193234
Fax: 91-40-7160386, 91-40-7193626

---

[36] Indian Institute of Chemical Technology, website: http://www.iictindia.org/

Industry

Tata Robins Fraser Ltd[37]

The company is regarded as one of the most comprehensive sources of engineering equipment, systems and services. It manufactures bulk material handling and processing equipment, bulk materia handling systems, coke oven equipment, coal dust injection systems for blast furnaces, coal beneficiation systems, and port and yard equipment. Engineering Procurement and Construction (EPC) and Engineering Procurement and Construction Management (EPCM) services are also provided. The company caters to diverse industries including power, metallurgy, chemical, mining and cement.

Areas of business

The company offers a wide range of products and services

- Bulk material handling equipment
- Bulk material processing equipment
- Bulk material handling systems
- Coke oven equipment
- Coal dust Injection Systems
- Coal Beneficiation Systems
- Port and yard equipment
- EPC and EPCM services

Contact Information:

Santosh K Gupta
Managing Director
Head Office and works
11, Station Road, Burma Mines
Jamshedpur-831 007
India
Tel: +91-0657-431313-17/430071-85
Fax: +91-0657-431075
Email: co@jsr.trfltd.com
www.trfltd.com

ndustrial Equipment Manufacturing Company Private Ltd

Industrial Equipment Manufacturing Company Private Ltd is a manufacturer of Haulages, Cranes, Industrial Fans and Pollution Abatement systems. The company has a performance record of design, manufacture, quality control, and performance testing of the products for various industries and applications.

---

[37] Tata Robins Fraser Ltd, Website: www.trfltd.com
[38] Industrial Equipment Manufacturing Co. Pvt. Ltd,

Customers

Coal India Ltd and its Subsidiaries (ECL, BCCL, WCL, SECL, NECL, CCL & SCCL)
TISCO (Tata Iron & Steel Company)
Hindustan Construction Company Ltd

Contact Information:

Managing Director
Industrial Equipment Manufacturing Co. Pvt. Ltd.
P-559, Hemanta Mukerjee Sarani
Lake Road, Ground Floor
Kolkata-700 029
West Bengal
Tel: +91-33-463 5264
+91-33-463 9155
Fax: +91 33 466 4751
+91 33 463 5263

ALSTOM India[39]

ALSTOM, the global specialist in Energy & Transport infrastructure, is in the business of providing quality solutions and system designs.

ALSTOM has been a long-term player in India in the energy business, supplying critical equipment including boilers and turbines and pollution control equipment for power plants, and transmission & distribution equipment. Alstom also has a significant presence in the transport sector in India. ALSTOM India helps generate nearly 40% of the total power produced in the country.

ALSTOM in India has two listed companies, 12 manufacturing units, and 30 business offices spread all over the country.

Contact Information

Ela Sanyal
ALSTOM Power India Ltd
Chandiwala Estate
Maa Anand Mai Marg
Kalkaji, New Delhi 110 019
Tel: +91-11-6826100/6826150
www.alstom.co.in

---

[39] Alstom India, Website: www.alstom.co.in

Trade associations

Confederation of Indian Industry (CII)[40]

Its primary goal is to develop Indian industry and to ensure that government and society as a whole, understand both the needs of industry and its contribution to the nation's well being.

Functions

- To identify and strengthen industry's role in the economic development of the country.
- To act as a catalyst in bringing about the growth and development of Indian Industry.
- To reinforce industry's commitment to society.
- To provide up-to-date information and data to industry and government.
- To create awareness and support industry's efforts on quality, environment and consumer protection.
- To identify and address the special needs of the small sector.
- To promote cooperation with counterpart organisations.
- To work towards the globalisation of Indian industry and integration into the world economy.

This is done by adopting a proactive and partnership approach with the Government on various national and international issues concerning the India economy. It closely interacts on policy issues at both the central and state levels and conducts extensive dialogue and interaction with members and all sections of the community, to build consensus.

Contact Information:
Mr Sajal Ghosh
Executive Officer, Energy Divison
Confederation of Indian Industry
Gate No.31, North Block
J N Stadium, Lodhi Road
New Delhi 110 003
www.ciionline.org

ederation of Indian Chambers of Commerce & Industry (FICCI)[41]

Today with a membership of over 500 Chambers of Commerce, Trade Associations and Industry bodies, it speaks directly and indirectly for over 0.25 million business units- small, medium and large-employing around 20 million people.

It is pursuing strategies to integrate India with the global economies that will help attain greater rewards for the common man.

As a pro-active body, FICCI has been at the forefront of:

---

[40] Confederation of Indian Industry, www.ciionline.org

[41] Federation of Indian Chambers of Commerce & Industry, Website: www.ficci.com

- Analysing dispassionately the impact of events through a multi-disciplinary team for business, academia, policy makers and foreign experts
- Identifying glitches that hamper the process of implementation
- Evolving problem solving responses

Contact Information:
Mr Krishnan Kalra
Addl. Secretary (Head- International Affairs)
Mr Vivek Pandit
Asstt. Secretary (Hydrocarbons, Power Sector)
Ms Ambika Sharma
Addl. Secretary (West & East Europe)

Federation of Indian Chambers of Commerce & Industry
Federation House, Tansen Marg
New Delhi-110 001
Tel: +91-11-3738760-70
Fax: +91-11-3320714/3721504
Email: ficci@ficci.com
www.ficci.com

PHD Chamber of Commerce and Industry (PHDCCI)[42]

It was established in 1905, and is an apex body covering the Northern Region of India. The chamber has a direct membership of more than 1630 large and medium enterprises and indirectly it serves more than 50,000 organisations. The Chamber has established special relationship with important organisations, Governments/Governmental organisations all over the world.

In view of a large number of Chamber members being engaged in international business, exports as well as co-operation in technology and investment, PHDCCI has a separate International Trade Division, which explores possibilities for promoting international trade and other business links.

Contact Information:
Mr Abraham Varughese
Senior Engineer
Energy Management Cell
PHD Chamber of Commerce and Industry
PHD House, Opp Asian Games Village
New Delhi 110 016
Tel: +91-11-6857750,6863801-44
Fax: +91-11-6855450

---

[42] PHD Chamber of Commerce and Industry

Others

Infrastructure Development Finance Company Ltd. (IDFC)[43]

IDFC, as on June 30, 2002 on a cumulative basis, has approved financial assistance to 87 projects aggregating over Rs 10,403 crore. IDFC has also broadened its initial focus on power, roads, ports and telecommunications to a framework of energy, telecommunications and information technology, integrated transportation, urban infrastructure and food and agri-business infrastructure. In its sectors of engagement, IDFC has been awarded lead arranger mandates and key advisory assignments.

Key initiatives in keeping with IDFC's policy advisory mandate of providing leadership in rationalising policy and regulatory frameworks, and removing impediments to the movement of capital to infrastructure sectors, have been undertaken.

Contact Information
Nasser Munjee
Managing Director and CEO

A K T Chari
Chief Operations Officer

Anoop Seth
Chief Financial Officer

Registered Office
ITC Centre, 3rd Floor
760, Anna Salai
Chennai 600 002
Phone: +91 44 855 9440/48/56
Fax: +91 44 854 7597
www.idfc.com

State Bank of India Capital Markets Ltd[44]

Leading Investment Bank having expertise in the field of privatisation, Infrastructure Advisory, Syndication of funds both domestic & international, mergers and acquisition and advisory and financial engineering.

Contact Information
Mr Rajat Misra
Manager

---

[43] Infrastructure Development Finance Company Ltd, Website: www.idfc.com

[44] State Bank of India Capital Markets Ltd, Website: www.sbicaps.com

Project Advisory & Structured Finance,
202, Maker Tower E
Cuffe Parade, Mumbai 400 005
Maharashtra
Phone: +91-22-2189166-69
Fax: +91-22-2188332
Email: corporate.office@sbicaps.com
www.sbicaps.com

Industrial Credit Investment Corporation Ltd (ICICI)[45]

ICICI is a diversified financial institution providing medium and long-term project financing and other types of financial and advisory services to private industry.

The sources of funds vary from loans, debentures, equity to lines of credit available from inter country cooperation programs. ICICI also provides specialised assistance namely Technology Financing for various technologies Development/demonstration/commercialisation projects mainly through various programmes of USAID and World Bank.

ICICI is implementing the Trade in Environment Services and Technologies (TEST), a USAID programme, which has been restructured to the 'Clean Technology Initiative' (CTI) for the Industrial sector.

CTI targets the rapidly growing energy intensive industrial sectors that are high GHG emitters to improve their environmental performance. Technical assistance is provided to those companies that are most likely to accelerate the use of cleaner climate friendly technologies and adopt certified environmental management systems as to reduce GHG emissions.

Contact Information
ICICI Ltd
ICICI Towers, NBCC Place
Pragati Vihar, Lodhi Road
New Delhi
Tel: +91-11-4368018-23
Contact Person: Mr Unnikrishnan
Website: www.icici.com

Industrial Finance Corporation of India (IFCI)[46]

The Industrial Finance Corporation Of India (IFCI) is a public limited company that gives medium and long-term credit to industrial concerns.

---

[45] Industrial Credit Investment Corporation Ltd, Website: www.icici.com

[46] Industrial Finance Corporation of India, Website:

The financing operations of IFCI include project financing, financial services and comprehensive corporate advising services. The financial assistance is provided to industries by way of rupee loans, foreign currency loans and direct subscription to issues of shares/debentures.

Financial assistance is granted to viable industrial projects. Each project is evaluated with regard to its technical feasibility, commercial viability, financial soundness and economic justification.

IFCI has no specific schemes for environment projects but greater emphasis is now being laid on environment. IFCI has a scheme for technology upgradation in the textile sector wherein emphasis is laid on induction of improved technology for the purpose of energy saving.

Contact Information

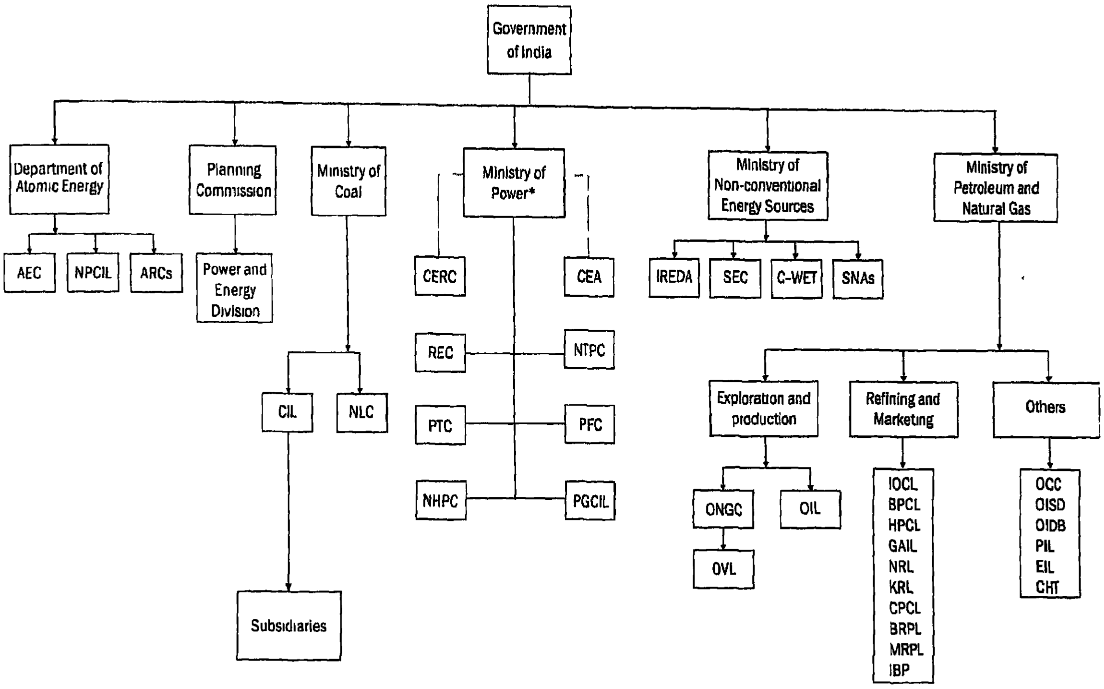
Industrial Finance Corporation of India (IFCI)
IFCI Tower, 13th Floor
61, Nehru Place
New Delhi-19
Tel: +91-11-6487370/6487444

Mr R K Chavali, General Manager
Tel: +91-11-6487405
Fax: +91-11-6230201
Email: chavali@ho.ifcimail.com

Bibliography

1.Annual Report 2001-2002
(Ministry of Coal & Mines) Dept. of Coal, Government of India
2.Annual Report 2001-2002
Ministry of Power, Government of India
3.Annual Report 2001-2002
Ministry of Steel, Government of India
4. www.platts.com
5. http://cmpdi.nic.in
6. http://ncl.nic.in
7. http://westerncoal.nic.in
8. http://bccl.nic.in
9. http://www.coalindia.com
10. http://ccl.nic.in
11. http://powermin.nic.in
12. http://coal.nic.in
13 http://www.iictindia.com
14. www.bhel.com
15. www.ntpc.com
16. Infrastructure Directory 2002: Confederation of Indian Industry.
17. http://www.hecltd.com/
18. http://www.iictindia.org

Annexure I



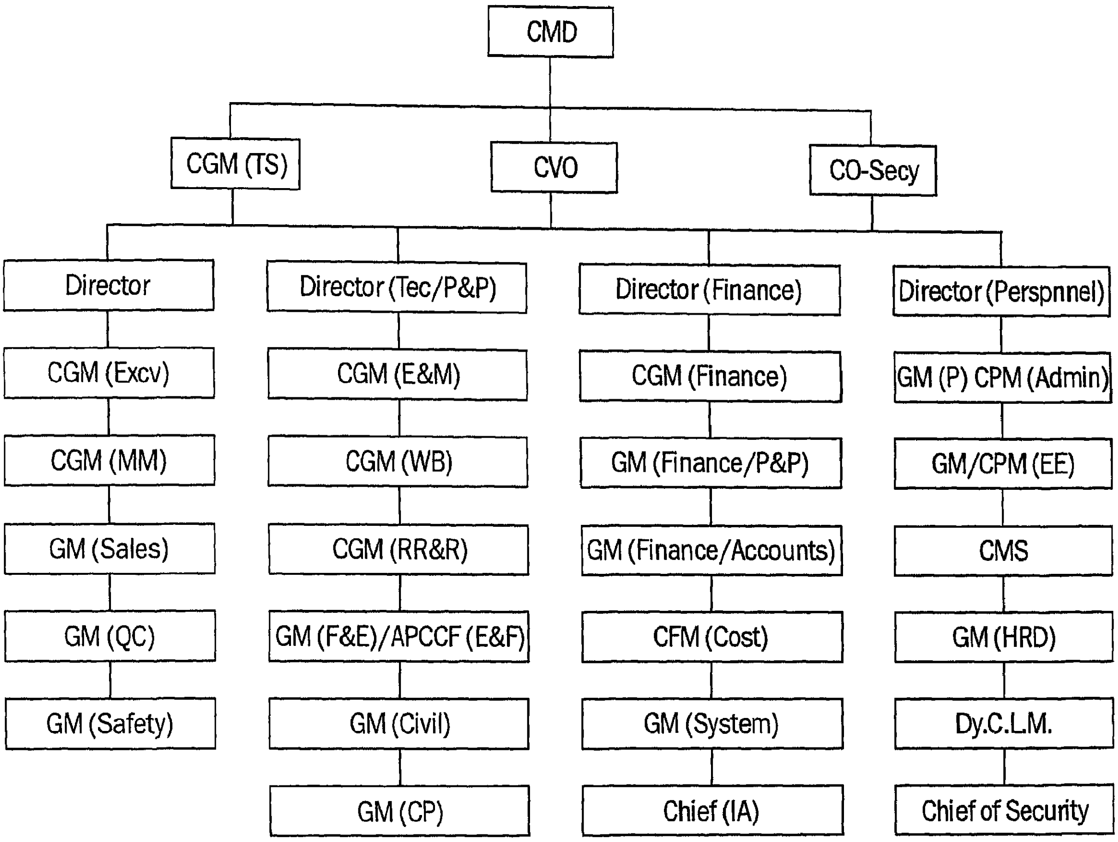
Organization of the energy sector

AEC - Atomic Energy Commission
ARCs - Atomic research centres
BPCL - Bharat Petroleum Corporation Ltd
BRPL - Bongaigaon Refinery and Petrochemicals Ltd
CEA - Central Electricity Authority
CERC - Central Electricity Regulatory Commission
CHT - Centre for High Technology
CIL - Coal India Ltd
CPCL - Chennai Petrochemicals Corporation Ltd
C-WET - Centre for Wind Energy Technology
EIL - Engineers India Ltd
GAIL - Gas Authority of India Ltd
HPCL - Hindustan Petroleum Corporation Ltd
IOCL - Indian Oil Corporation Ltd
IREDA - Indian Renewable Energy Development Agency
IBPL - Indo-Burma Petroleum Company Ltd
KRL - Kochi Refineries Ltd
MRPL - Mangalore Refinery and Petrochemicals Ltd
NHPC - National Hydroelectric Power Corporation
NLC - Neyveli Lignite Corporation
NPCIL - Nuclear Power Corporation of India Ltd
NRL - Numaligarh Refineries Ltd
NTPC - National Thermal Power Corporation
OCC - Oil Coordination Committee
OIL - Oil India Ltd
OIDB - Oil Industry Development Board
OISD - Oil Industry Safety Directorate
ONGC - Oil and Natural Gas Corporation
OVL - ONGC Videsh Ltd
PFC - Power Finance Corporation
PGCIL - Power Grid Corporation of India Ltd
PIL - Petroleum India International
PTC - Power Trading Corporation
REC - Rural Electrification Corporation
SEC - Solar Energy Centre
SNAs - State nodal agencies

* The state governments operate through SEBs (state electricity boards). Several state governments have also appointed SERCs (state electricity regulatory commissions)

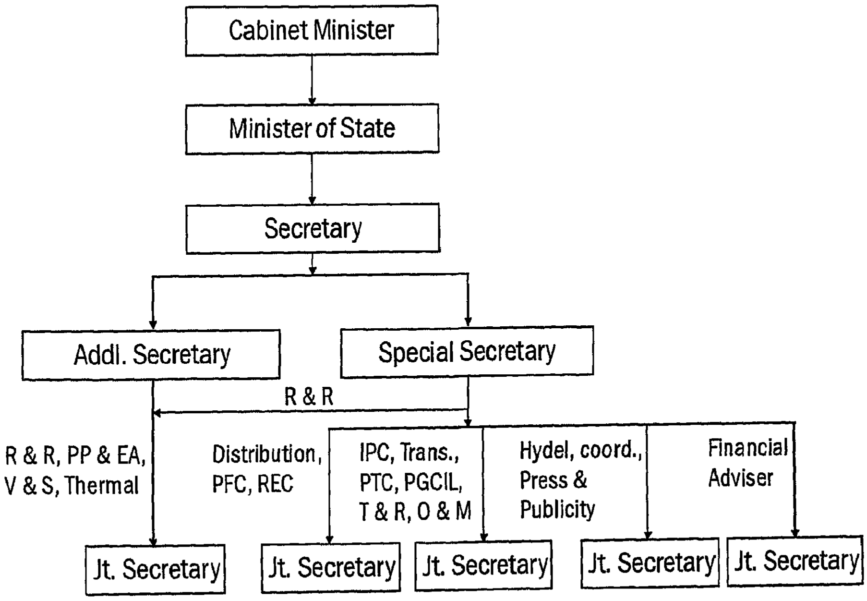
Annexure II

Organizational setup of Coal India



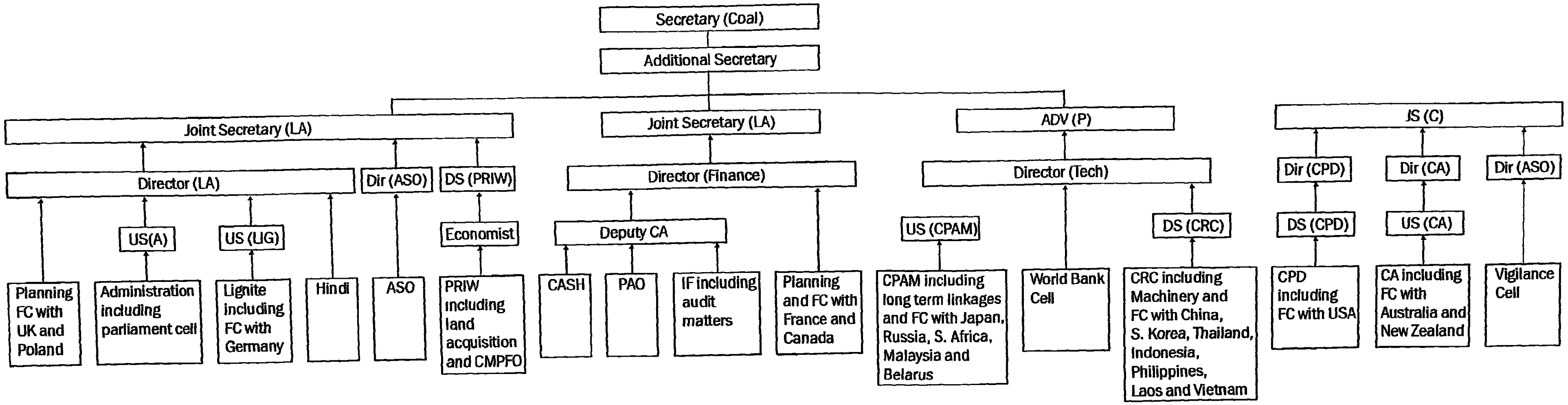
Annexure III

Organizational setup of Ministry of Power



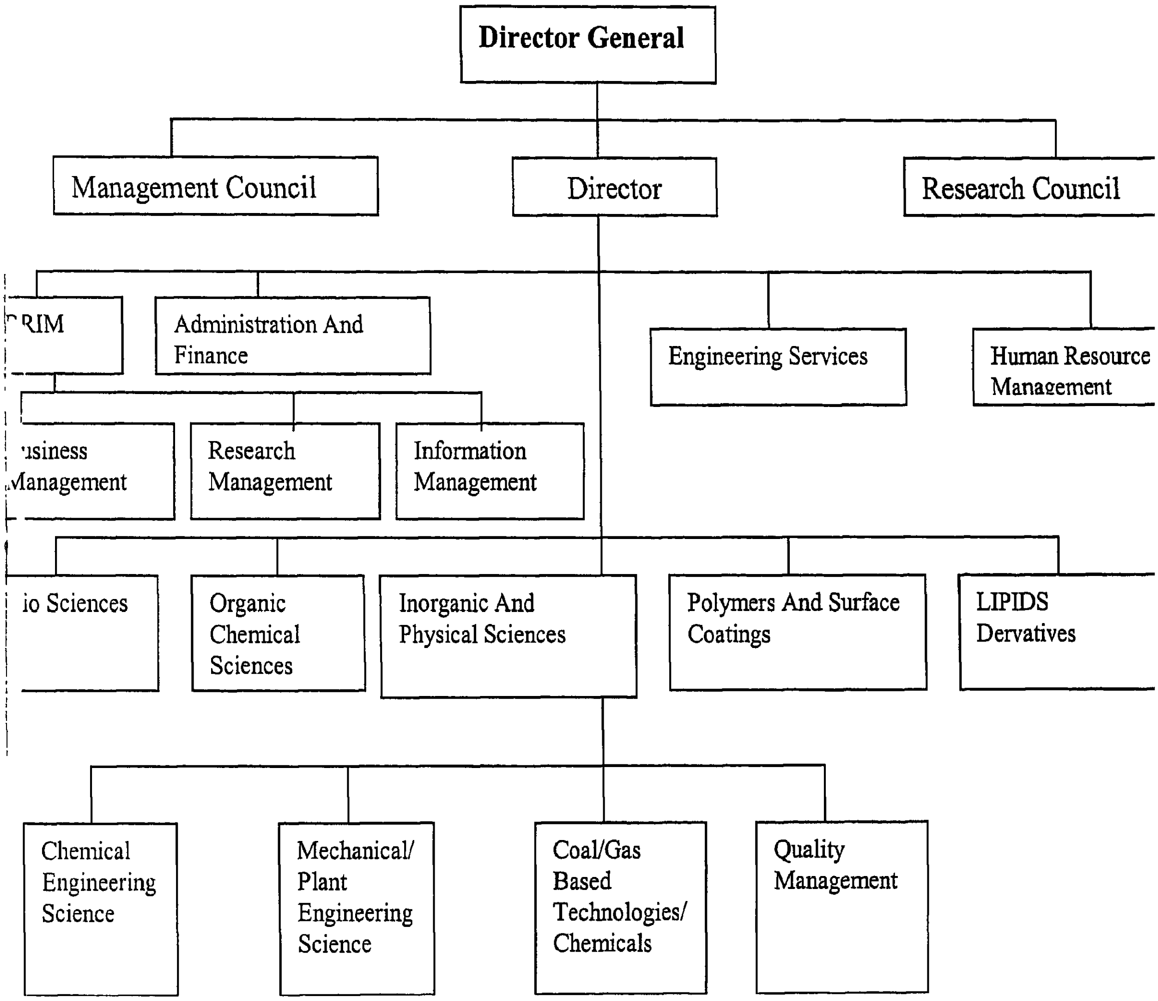
Annexure IV

Department of Coal


Secretary (Coal)
Additional Secretary
Joint Secretary (LA)
Joint Secretary (LA)
ADV (P)
JS (C)
Director (LA)
Dir (ASO)
DS (PRIW)
Director (Finance)
Director (Tech)
Dir (CPD)
Dir (CA)
Dir (ASO)
US(A)
US (LIG)
Economist
Deputy CA
US (CPAM)
DS (CRC)
DS (CPD)
US (CA)
Planning FC with UK and Poland
Administration including parliament cell
Lignite including FC with Germany
Hindi
ASO
PRIW including land acquisition and CMPFO
CASH
PAO
IF including audit matters
Planning and FC with France and Canada
CPAM including long term linkages and FC with Japan, Russia, S. Africa, Malaysia and Belarus
World Bank Cell
CRC including Machinery and FC with China, S. Korea, Thailand, Indonesia, Philippines, Laos and Vietnam
CPD including FC with USA
CA including FC with Australia and New Zealand
Vigilance Cell

Annexure V

Institutional Organisational Setup of Indian Institute of Chemical Technology, (CSIR)


Director General
Management Council
Director
Research Council
RIM
Administration And Finance
Engineering Services
Human Resource Management
usiness Management
Research Management
Information Management
io Sciences
Organic Chemical Sciences
Inorganic And Physical Sciences
Polymers And Surface Coatings
LIPIDS Dervatives
Chemical Engineering Science
Mechanical/ Plant Engineering Science
Coal/Gas Based Technologies/ Chemicals
Quality Management